Chunghwa Picture Tubes, Ltd.
Product Specification

To :
Date :

TFT LCD
CLAA102NA2CCN

ACCEPTED BY :

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REVISION STATUS

Revision Notice	Description	Page	Rev. Date
V1	First revision		20081003

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1. OVERVIEW

CLAA102NA2CCN is 25.8cm(10.2”) color TFT-LCD (Thin Film Transistor Liquid Crystal Display) module composed of LCD panel, driver ICs, control circuit and LED backlight. By applying 1024×600 images are displayed on the 10.2” diagonal screen. Display 262K colors by 6 Bit R.G.B signal input. Use 3.3 voltage to drive the power of LCD system. Use 5.0 voltage to drive the power of LED backlight.

General specification are summarized in the following table:

ITEM	SPECIFICATION			
Panel Size	10.2 inch(panel diagonal)			
Display Area (mm)	222.72(H) x 130.5(V) (10.2-inch diagonal)			
Number of Pixels	1024(H) × 3(RGB) × 600(V)			
Pixel Pitch (mm)	0.2175 (H) × 0.2175 (V)			
Color Pixel Arrangement	RGB vertical stripe			
Display Mode	Normally white			
Number of colors	262,144			
Brightness(cd/m^2)	200 Typ. (5-point Average)			
Response Time (ms)	20 Typ.			
Outline Dimension(mm)		Min.	Typ.	Max.
	Horizontal (H)	234.9	235.2	235.5
	Vertical (V)	145.6	145.9	146.2
	Depth (D)	5.4	5.7	6.0
Viewin Angle(BL on,CR≧10)	90 degree (Horizontal.)			
	60 degree (Vertical)			
Power consumption (W)	3.6(w) (Typ)			
BL unit	LED			
Electrical Interface(data)	LVDS			
Viewing Direction	6 o´clock			
Weight(g)	250(Typ)			
Surface Treatment	Anti-Glare type, Hardness:3H			

2. ABSOLUTE MAXIMUM RATINGS

The following are maximun values which, if exceeded, may cause faulty operation or damage to the unit.

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	Vcc	-0.3	4.0	V	
LED Supply Voltage	VLED	-0.3	6.0	V	
Static Electricity	VESDc	-200	200	V	【Note2】
	VESDm	-15K	15K	V	
ICC Rush Current	IRUSH	-	1	A	【Note 3】
Operation Temperature	T_{op}	0	50	℃	【Note 1】
Storage Temperature	T_{stg}	-20	60	℃	【Note 1】

【Note】

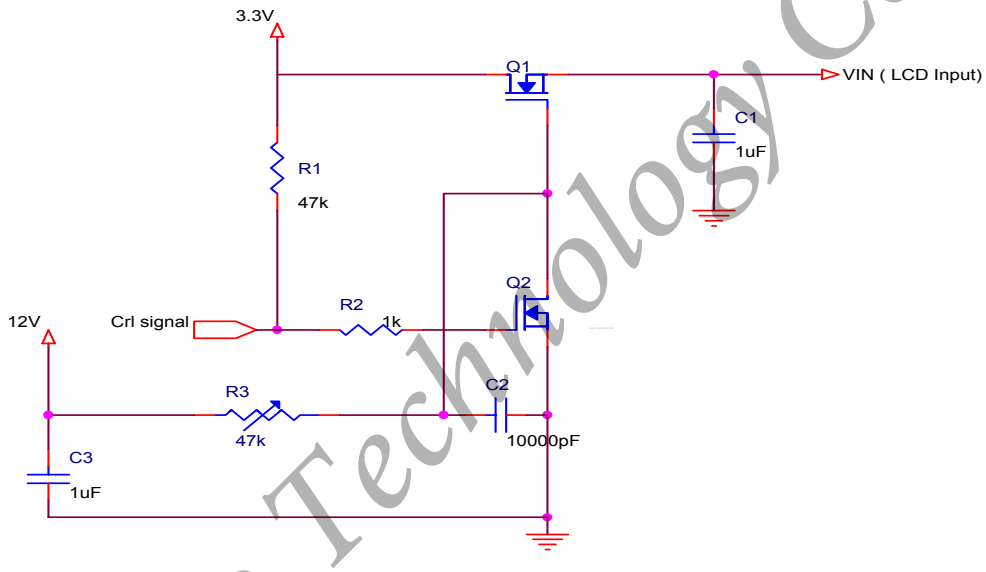
【Note1】If users use the product out off the environmemt operation range（temperature and humidity）,it will concern for visual quality.

【Note2】Test Condition: IEC 61000-4-2 ,

VESDc ：Contact discharge to input connector

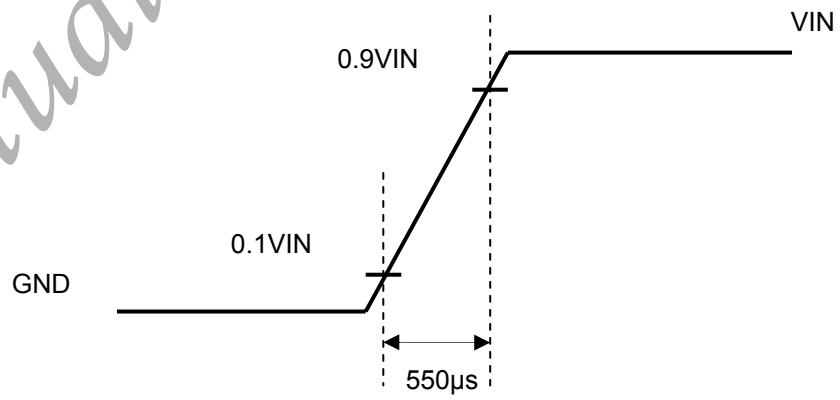
VESDm：Discontact discharge to module

【Note3】The input pulse-current measurement system as below：



Control signal:High(+3.3V)→Low(GND)

Supply Voltage of rising time should be from R3 and C2 tune to 550 us.



Rising Time

3. ELECTRICAL CHARACTERISTICS

3.1 TFT LCD Power Voltage

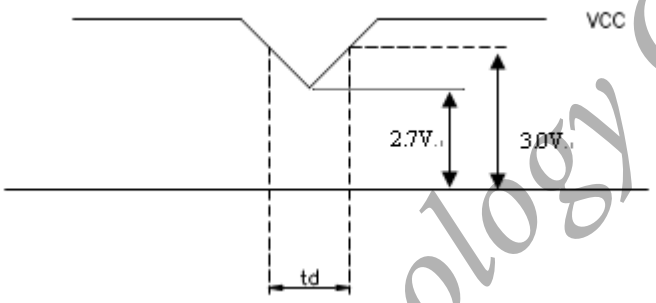
Ta=25℃

Item		Symbol	Min.	Typ	Max.	Unit	Note
Power Supply Voltage For LCD		V_{CC}	3.0	3.3	3.6	V	【Note 1】
Power Supply Voltage For LED		V_{LED}	4.5	5	5.5	V	
Logic Input Voltage (LVDS:IN+,IN-)	Input Voltage	VIN	0	-	V_{CC}	V	【Note 2】
	Common Mode Voltage	VCM	1.08	1.2	1.32	V	【Note 2】
	Differential Input Voltage	| VID |	250	350	450	mV	【Note 2】
	Threshold Voltage(high)	VTH	-	-	100	mV	【Note 2】
	Threshold Voltage(low)	VTL	-100	-	-	mV	【Note 2】
ADJ Input Voltage	Input Voltage(high)	VIH	3.0		3.3	V	
	Input Voltage(low)	VIL	GND		0.3	V	

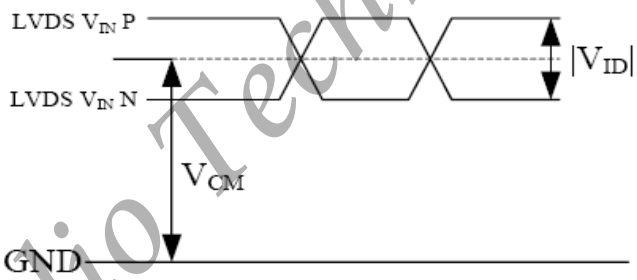
Remarks：

【Note1】 VCC –dip codition:

1) When 2.7 V≦VCC＜3.0V，td≦10ms.
2) VCC＞3.0V，VCC-dip condition should be same as VCC-turn-on condition.



【Note 2】LVDS signal



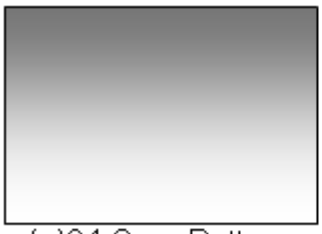
|VID| = |VTH – VTL|,

VCM =(VTH + VTL)/2

3.2 TFT-LCD Current Consumption

Item	Symbol	Min.	Typ	Max.	Unit	Note
LCD Power Current	I_{CC}	--	250	350	mA	【Note1】
LED Power Current	I_{LED}	--	500	600	mA	【Note2】

【Note1】Typical: Under 64 gray pattern @ Vcc = 3.3 V
Maximum: Under black pattern @ Vcc = 3.0 V



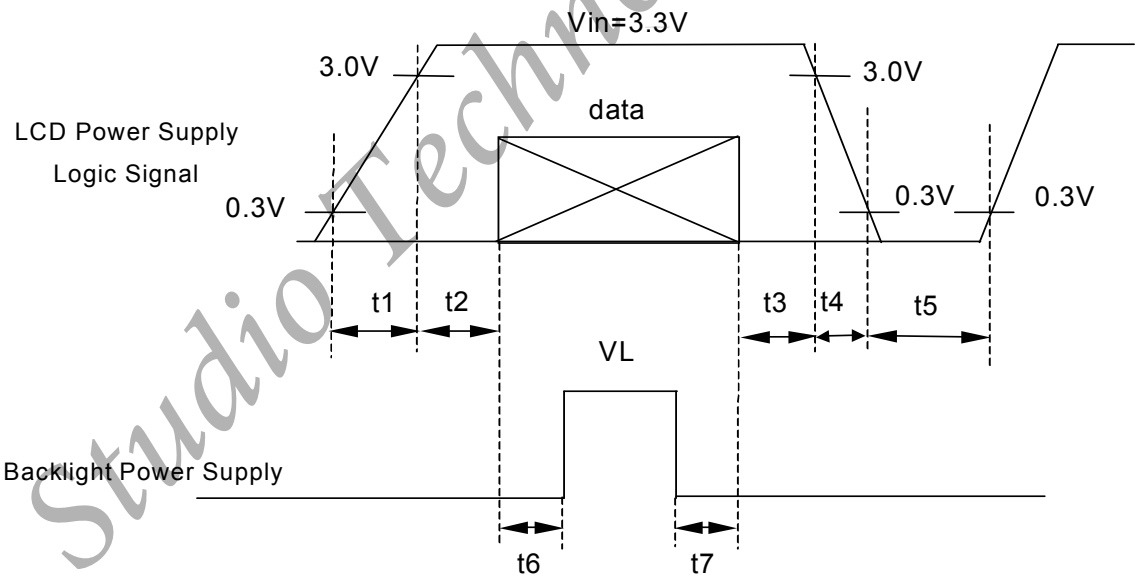
(a)64 Gray Pattern

(b)Black Pattern

【Note2】Typical: When V_{LED} is 5V
Maximum: When V_{LED} is 4.5V

3.3 Power、Signal sequence

0.5<t1≦10ms 200ms≦t5
0＜t2≦50ms 200ms≦t6
0＜t3≦50ms 200ms≦t7
0＜t4≦10ms



Data: RGB DATA, DCLK, DENA

4. INTERFACE CONNECTION

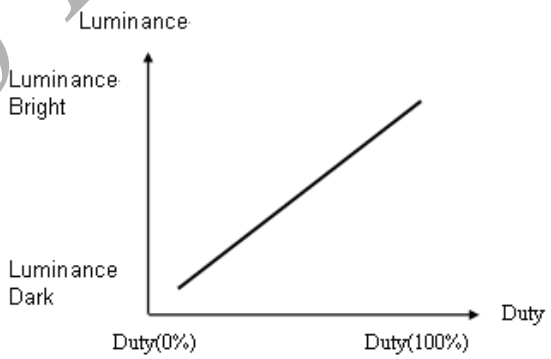
4.1 CN1

Connector type：093F30-B0B01A

Pin No.	SYMBOL	FUNCTION
1	GND	Ground
2	V_{CC}	+3.3V Power
3	V_{CC}	+3.3V Power
4	V_EDID	3.3V Power for NB
5	ADJ	Adjust for LED brightness
6	CLK_EDID	EDID Clock for NB
7	DATA_EDID	EDID Data for NB
8	RXIN0-	LVDS Signal(-)—channel 0
9	RXIN0+	LVDS Signal(+)—channel 0
10	GND	Ground
11	RXIN1-	LVDS Signal(-)—channel 1
12	RXIN1+	LVDS Signal(+)—channel 1
13	GND	Ground
14	RXIN2-	LVDS Signal(-)—channel 2
15	RXIN2+	LVDS Signal(+)—channel 2
16	GND	Ground
17	RXCLKIN-	LVDS Clock Signal(-)
18	RXCLKIN+	LVDS Clock Signal(+)
19	GND	Ground
20	NC	NC
21	NC	NC
22	GND	Ground
23	GND	Ground
24	V_{LED}	Power Supply for LED(V_{LED} =5.0±0.5)
25	V_{LED}	Power Supply for LED(V_{LED} =5.0±0.5)
26	V_{LED}	Power Supply for LED(V_{LED} =5.0±0.5)
27	NC/YD	(Touch Panel control pin)
28	NC/XL	(Touch Panel control pin)
29	NC/YU	(Touch Panel control pin)
30	NC/XR	(Touch Panel control pin)

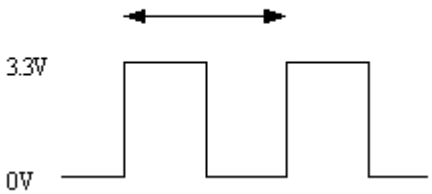
【Note】

1) ADJ adjust brightness to control Pin，Pulse duty the bigger the brighter.



2) ADJ signal=0~3.3V，operation frequency：25KHZ±5KHz

F = 25KHz ±5KHz，T=0.05ms



3) GND Pin must ground contact，can not be floating.

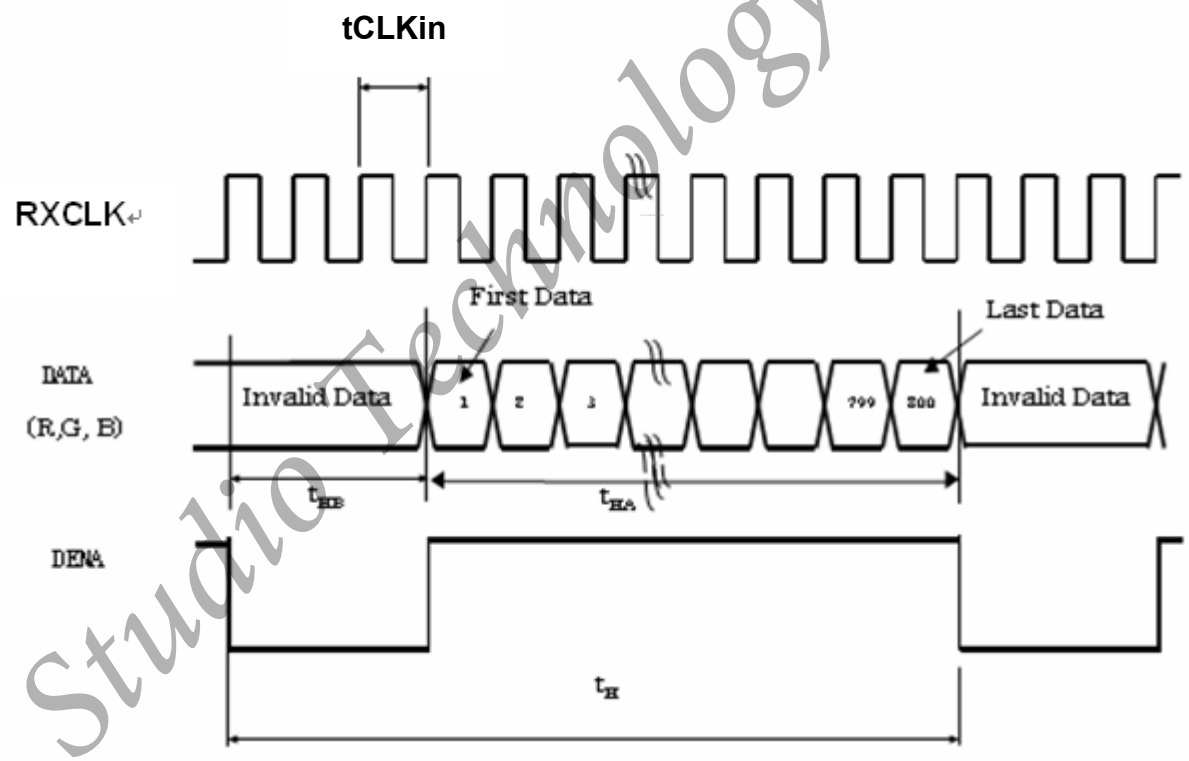
5. INPUT SIGNAL

5.1 Timing Specification

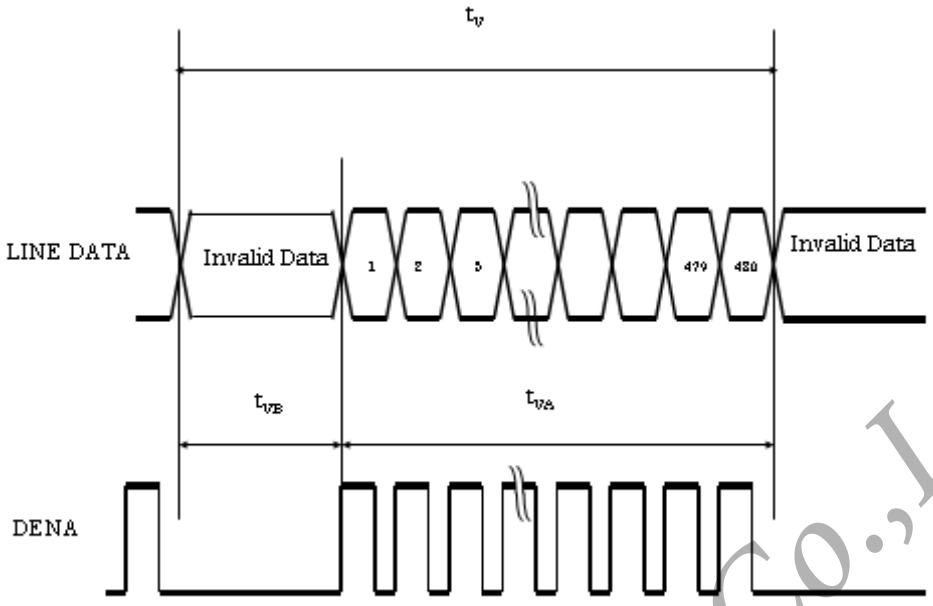
Item				Symbol	Min	Typ	Max	Unit
LVDS input signal sequence	CLK Frequency			fCLKin	39.05	45	51.42	MHz
	CLK Period			tCLKin	25.61	22.22	19.45	ns
LCD input timing	DENA	Horizontal	Horizontal Total Time	t_H	1160	1200	1240	tCLK
			Horizontal Effective Time	t_{HA}	1024	1024	1024	tCLK
			Horizontal Blank Time	t_{HB}	136	176	216	tCLK
		Vertical	Frame	fV	55	60	65	Hz
			Vertical Total Time	t_V	612	625	638	t_H
			Vertical EffectiveTime	t_{VA}	600	600	600	t_H
			Vertical Blank Time	t_{VB}	12	25	38	t_H

5.2 Timing sequence (Timing chart)

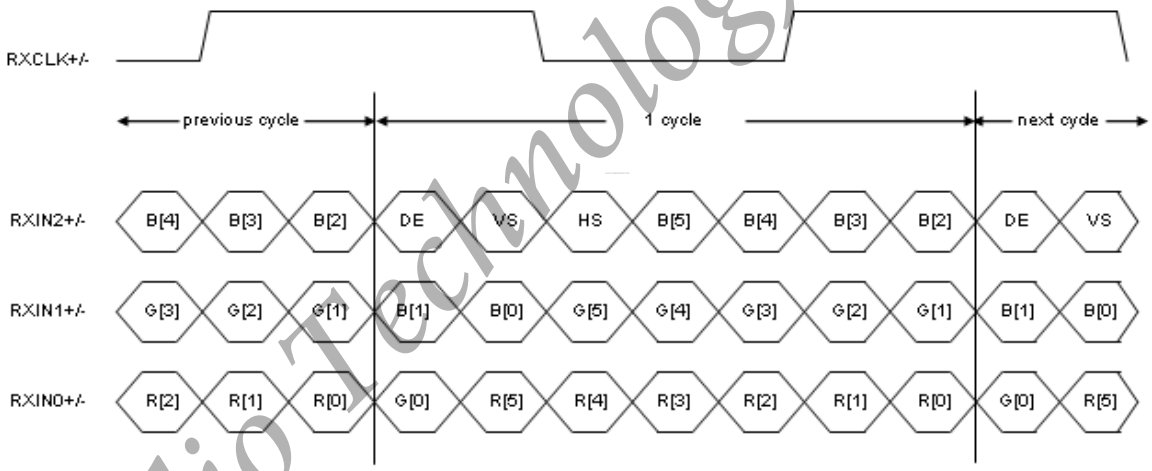
5.2.1 Horizontal Timing Sequence



5.2.2 Vertical Timing Sequence



5.2.3 LVDS Input Data mapping



5.3 Color data assignment

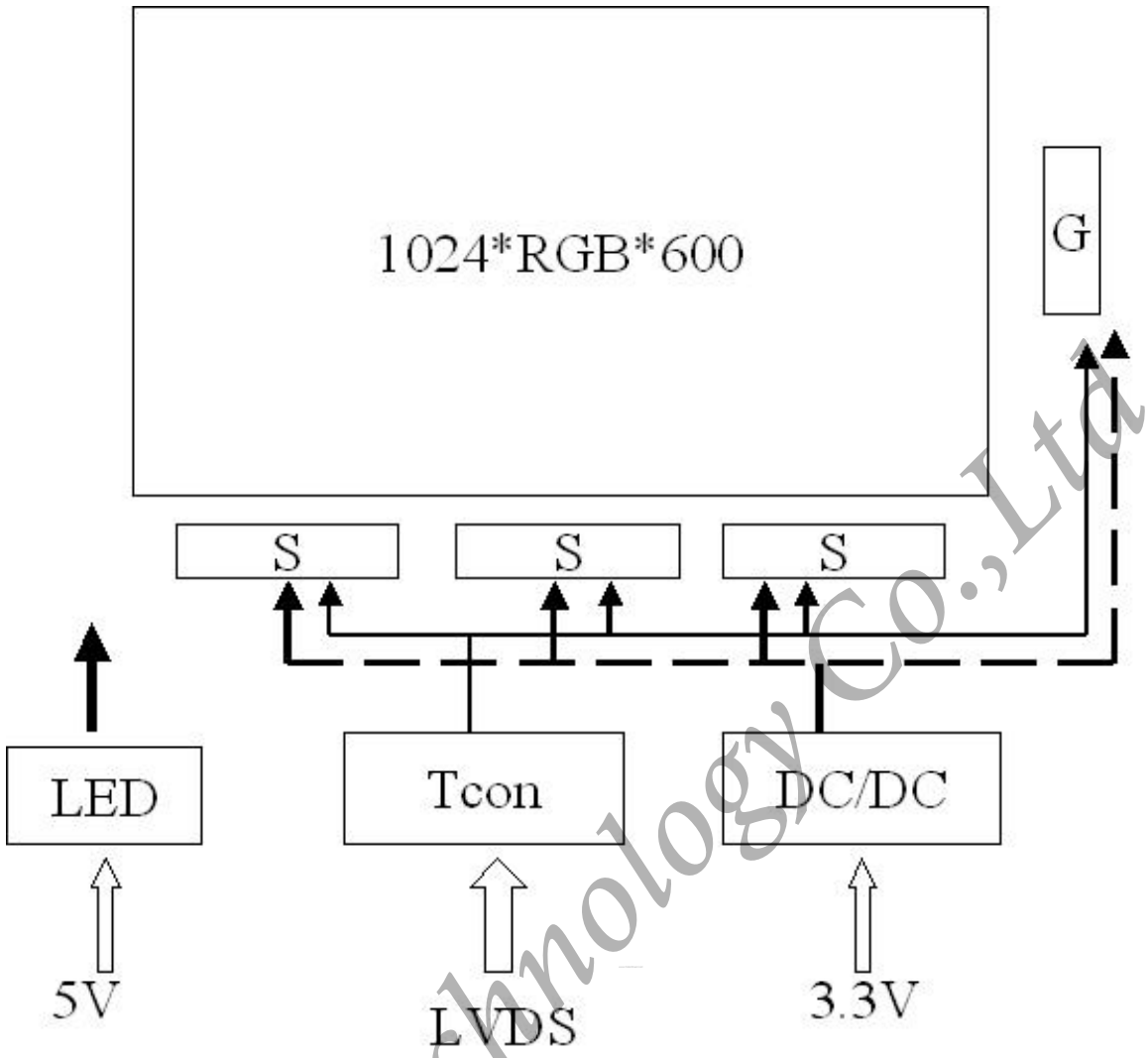
COLOR	INPUT	R DATA						G DATA						B DATA					
	DATA	R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
		MSB					LSB	MSB					LSB	MSB					LSB
BASI COLOR C	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	GREEN(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

【Note1】Definition of Gray Scale

color(n)：n is series of Gray Scale. The more n value is, the bright Gray Scale.

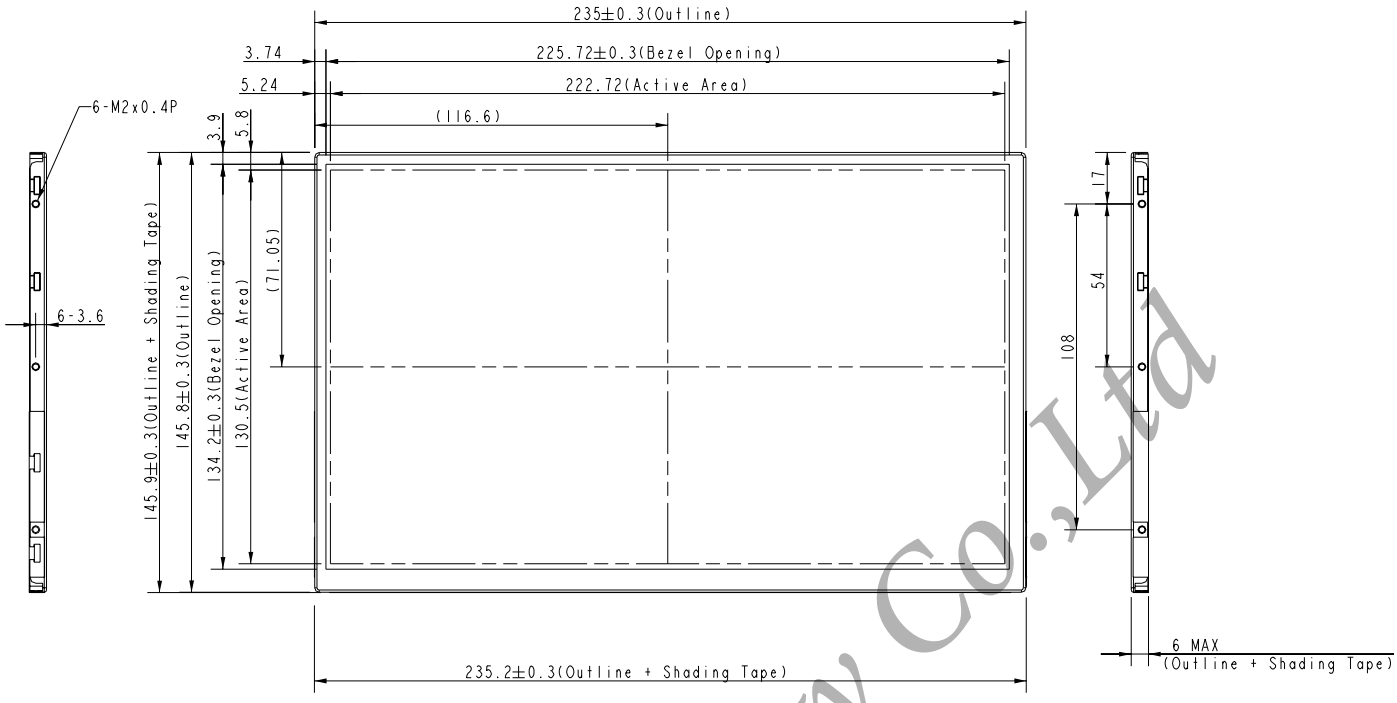
【Note2】Data:1-High,0-Low

6. BLOCK DIAGRAM



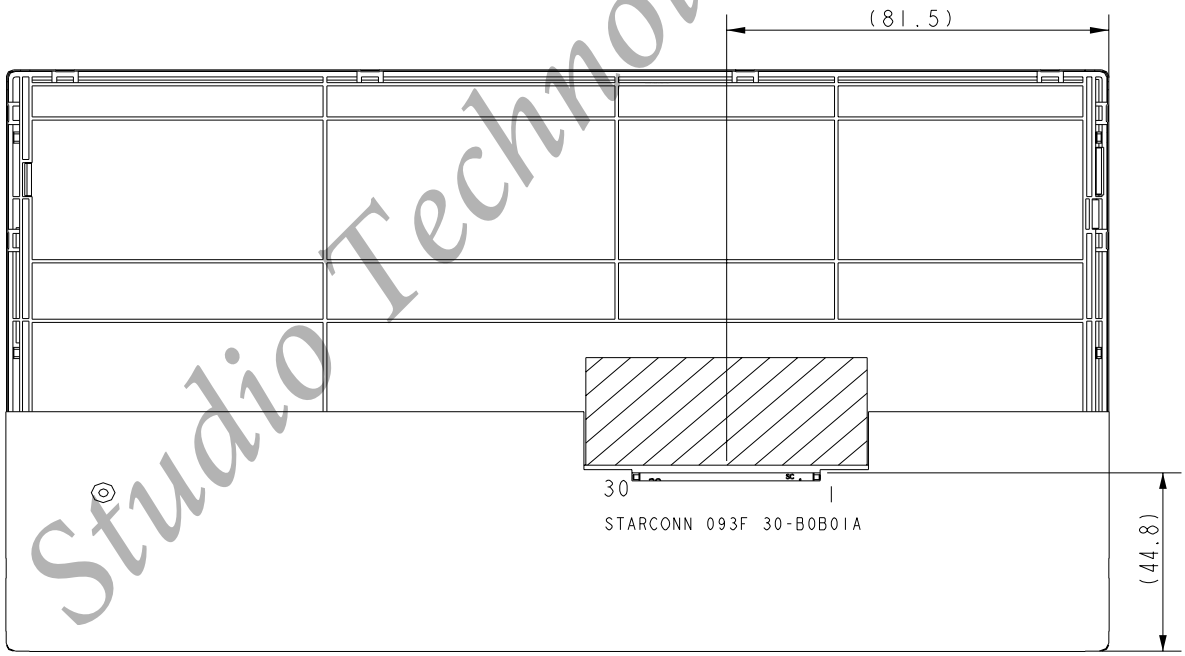
7. MECHANICAL DIMENSION

7.1 Front Side



[Note]：Tolerance is ±0.3mm unless noted

7.2 Rear Side



NOTE:
1.General tolerance=±0.3
2.Depth of screw insertion is 1.5mm MAX
3.Screw torque of side mount =2.5kg/cm MAX
4.User connecter do not interference with plastic frame

[Note]：Tolerance is ±0.3mm unless noted

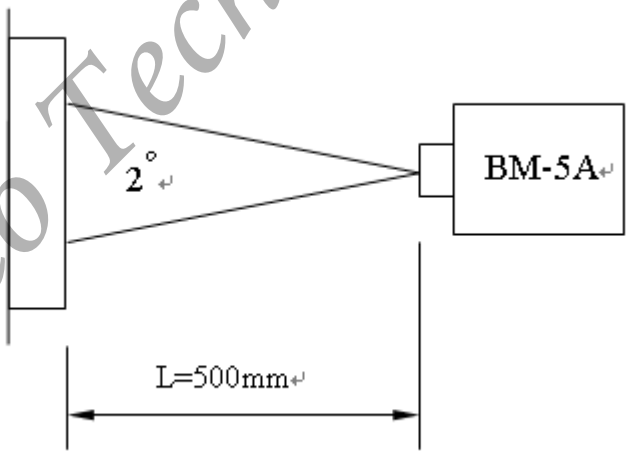
8. OPTICAL CHARACTERISTICS

Ta = 25°C, V_{CC} =3.3V

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Constrast Ratio		CR	Point-7	300	400	--	--	*1)*2)*3)
Average Luminance of White		$L_{W,AVE}$	5 Points	170	200	--	cd/m^2	*1)*3)
Luminance Uniformity		ΔL	13 Points	--	1.4	1.6	--	*1)*3)
Response Time (White - Black)		Tr+ Tf	Point-7	--	20	30	ms	*1)*3)*5)
Viewing Angle	Horizontal(φ)	Left(-)	CR≧10 Point-7	-30	-45	--	Degree	*1)*2)*4)
		Right(+)		+30	+45	--		
	Vertical (θ)	Lower(-)		-20	-35	--		
		Upper(+)		+10	+25	--		
Color Coordinate	White	Wx Wy	. θ = ϕ = 0° Point-7	0.273 0.289	0.313 0.329	0.353 0.369	--	*1)*3)
	Red	Rx Ry		0.521 0.293	0.561 0.333	0.601 0.373		
	Green	Gx Gy		0.304 0.539	0.344 0.579	0.384 0.619		
	Blue	Bx By		0.113 0.069	0.153 0.109	0.193 0.149		

NOTE：

*1)Measure condition：25℃±2℃，60±10%RH，under10 Lux in the dark room.BM-5A (TOPCON)，viewing angle2°，V_{CC}=3.3V ,V_{LED}=5V.



*2) Definition of contrast ratio：

Measure the point-7 as figure 8-1

Contrast Ratio (CR)= Brightness on the “White” state ÷ Brightness on the “Black” state

*3) Definition of luminance：

Measure white luminance (Lw) at 5 points as figure 8-1

$L_{W,AVE}$ = [Lw (4)+ Lw (5)+ Lw (7)+ Lw (9)+ Lw (10)] / 5

Definition of Luminance Uniformity:

Measure white luminance at the point 1~13 as figure 8-1

△L = Lw(Max) $_{13\ points}$ ÷ Lw(Min) $_{13\ points}$

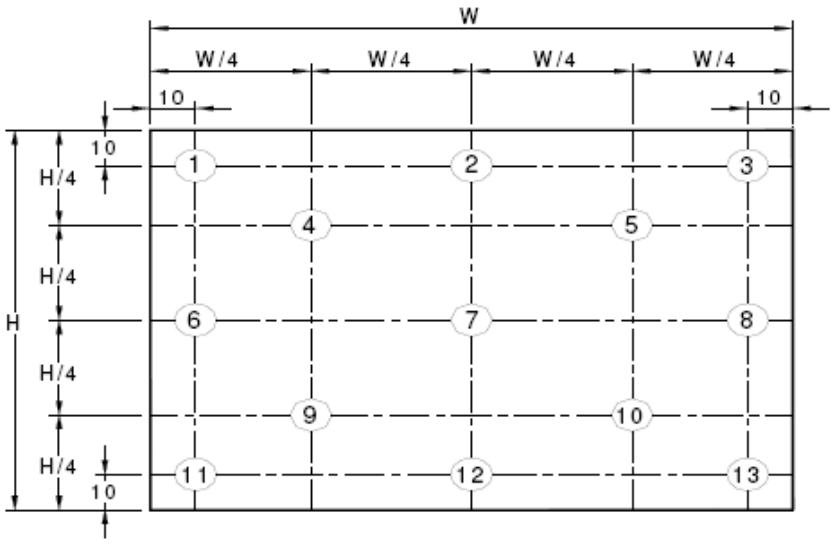


Fig8-1 Measuring point

*4) Definition of Viewing Angle(φ ,θ),refer to Fig8-2 as below：
These items are measured by EZ-CONTRAST(ELDIM) in the dark room. (no ambient light).

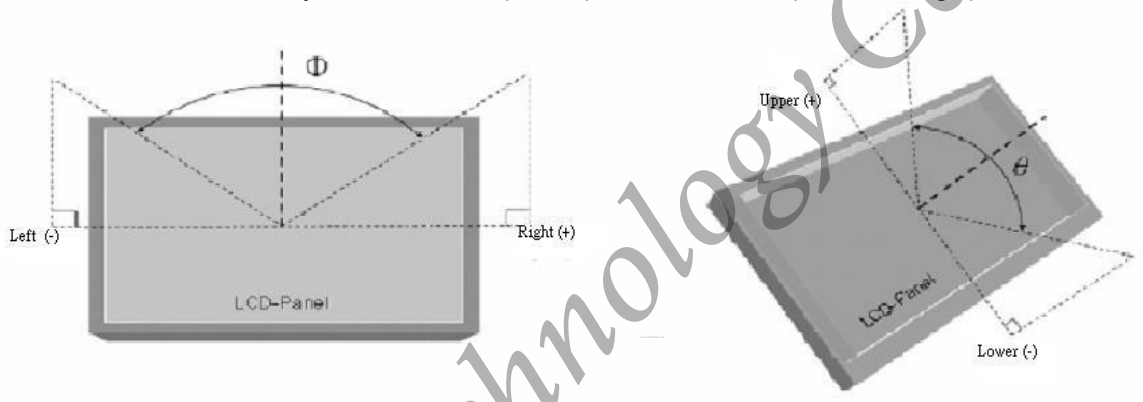


Fig8-2 Definition of Viewing Angle

*5) Definition of Response Time.(White-Black)

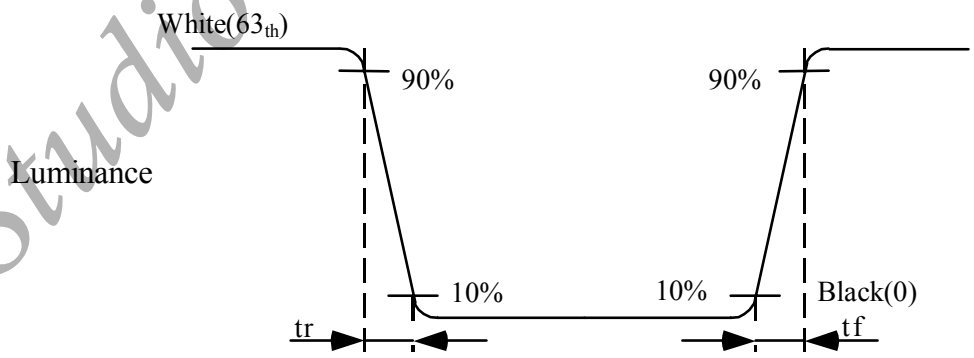


Fig8-3 Definition of Response Time(White-Black)

9. RELIABILITY TEST

9.1. Temperature and humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Operation	50℃，240Hrs	
High Temperature Storage	60℃，240Hrs	
High Temperature High Humidity Operation	60℃，90%RH，240Hrs	No condensation
Low Temperature Operation	0℃，240Hrs	
Low Temperature Storage	-20℃，240Hrs	
Thermal Shock	-20℃（0.5Hr）~ 60℃(0.5Hr) 200 cycles	

9.2. Shock and Vibration

TEST ITEMS	CONDITIONS
Shock (Non-operation)	● Shock level:980m/s^2(equel to 100G) ● Waveform:half sinusoidal wave,6ms. ● Number of shocks:one shock input in each direction of three mutually perpendicular axes for a total of three shock inputs.
Vibration (Non-operation)	● Frequency range: 10 to 500 Hz ● Vibration:sinusodial wave,perpendicular axis(x,z,y axis). ● Sweep: 1.5 g zero-to-peak, 10 to 500 Hz, 0.5 octave/minute.

9.3. ESD Test

ITEM	CONDITION	NOTE
ESD	150pF，330Ω，±8KV&±15KV air test	*1)
	200pF，0Ω，±250V contact test	*2)

NOTE：
*1) LCD glass and metal bezel
*2) IF connector pins

9.4 Judgment Standard

The Judgment of the above test should be made as follow:
Pass:Normal display image with no obvious non-uniformity and no line defect.Partial transformation of the module parts should be ignored.
Fail:No display image,obvious non-uniform,or line defect.

10. APPENDIX：EDID DESCRIPTION

Byte# (Hex)	Field Name and Comments	Value (Hex)	Value (Binary)
0		0	0000 0000
1		FF	1111 1111
2		FF	1111 1111
3		FF	1111 1111
4		FF	1111 1111
5		FF	1111 1111
6		FF	1111 1111
7		0	0000 0000
8	EISA manufacturer code = CPT (1st byte)	0E	0000 1110
9	(2nd byte)	14	0001 0100
0A	Product code LSB =	EC	1110 1100
0B	Product code MSB = (CLAA102NA2CCN=1260)	4	0000 0100
0C	ID (32-bit) serial number (preferred, but optional, zero if not used)	0	0000 0000
0D		0	0000 0000
0E		0	0000 0000
0F		0	0000 0000
10	Week of manufacture (preferred, but optional, zero if not used)	17	0001 0111
11	Year of manufacture (preferred, but optional, zero if not used)	12	0001 0010
12	EDID Structure version # = 1	1	0000 0001
13	EDID Revision # = 3	3	0000 0011
14	Video input definition (Digital I/P, non TMDS CRGB)	80	1000 0000
15	Max H image size (23.5) (rounded to cm)	17	0001 0111
16	Max V image size (14.58) (rounded to cm)	0E	0000 1110
17	Display gamma =2.2 (=(gamma*100)-100)	78	0111 1000
18	Features (no DPMS, Active off, RGB, timing BLK1)	0A	0000 1010
19	Red/Green low Bits	50	0101 0000
1A	Blue/White Low Bits	75	0111 0101
1B	Red X Rx = 0.561 bits 9→2	8F	1000 1111
1C	Red Y Ry = 0.333 bits 9→2	55	0101 0101
1D	Green X Gx = 0.344 bits 9→2	58	0101 1000
1E	Green Y Gy = 0.571 bits 9→2	94	1001 0100
1F	Blue X Bx = 0.153 bits 9→2	27	0010 0111
20	Blue Y By = 0.109 bits 9→2	1B	0001 1011
21	White X Wx = 0.313 bits 9→2	50	0101 0000
22	White Y Wy = 0.329 bits 9→2	54	0101 0100
23	Established Timing I (800 * 600 * 60Hz)	0	0000 0000
24	Established Timing II (1024 * 768 *60Hz)	0	0000 0000
25	Manufacturer's Timings not used	0	0000 0000

26	Standard Timing Identification 1 not used	1	0000 0001
27	Standard Timing Identification 1 not used	1	0000 0001
28	Standard Timing Identification 2 not used	1	0000 0001
29	Standard Timing Identification 2 not used	1	0000 0001
2A	Standard Timing Identification 3 not used	1	0000 0001
2B	Standard Timing Identification 3 not used	1	0000 0001
2C	Standard Timing Identification 4 not used	1	0000 0001
2D	Standard Timing Identification 4 not used	1	0000 0001
2E	Standard Timing Identification 5 not used	1	0000 0001
2F	Standard Timing Identification 5 not used	1	0000 0001
30	Standard Timing Identification 6 not used	1	0000 0001
31	Standard Timing Identification 6 not used	1	0000 0001
32	Standard Timing Identification 7 not used	1	0000 0001
33	Standard Timing Identification 7 not used	1	0000 0001
34	Standard Timing Identification 8 not used	1	0000 0001
35	Standard Timing Identification 8 not used	1	0000 0001
36	Pixel Clock *(LSB)*	D0	1101 0000
37	Pixel Clock = 45.6MHz 1024 * 600 @60.8Hz *(MSB)*	11	0001 0001
38	Horizontal Active = **1024** pixels Notes2 (lower 8 bits)	0	0000 0000
39	Horizontal Blanking = **176** pixels (lower 8 bits)	C0	1100 0000
3A	Horizontal Active : Horizontal Blanking(**thbp**) (upper 4:4 bits)	40	0100 0000
3B	Vertical Avtive =600 lines	58	0101 1000
3C	Vertical Blanking(**tvbp**) = **25**lines (DE Blanking min for DE-only panels) lines	19	0001 1001
3D	Vertical Active : Vertical Blanking(**tvbp**) (upper 4:4 bits)	20	0010 0000
3E	Horizontal Sync. Offset (**thfp**)= **48** pixels	30	0011 0000
3F	Horizontal Sync Pulse Width = **32** pixels(**WHL**)	20	0010 0000
40	Vertical Sync Offset (**tvfp**)= **3** lines,Sync Width(**tWVL**) = **6** lines	36	0011 0110
41	Horizontal Vertical Sync Offset/Width upper 2bits	0	0000 0000
42	Horizontal Image Size = **222.72mm** (lower 8bits)	DE	1101 1110
43	Vertical Image Size = **130.5mm** (lower 8bits)	82	1000 0010
44	Horizontal & Vertical Image Size (upper 4:4bits)	0	0000 0000
45	Horizontal Border = **X** (Zero for internal LCD)	0	0000 0000
46	Vertical Border = **X** (Zero for internal LCD)	0	0000 0000
47	Non-interlaced,Normal display,no stereo, Digital separate sync,H/V pol negatives	19	0001 1001
48	Flag	0	0000 0000
49	Flag	0	0000 0000
4A	Flag	0	0000 0000
4B	Data Type Tag: Descriptor Defined by Manufacture	0	0000 0000
4C	Flag	0	0000 0000
4D	value=HSPWmin/2 (pixel clks)WHL	0	0000 0000
4E	value=HSPWmax/2 (pixel clks)WHL	0	0000 0000

4F	value=Thbpmin/2 (pixel clks) (for DE-only timing also, with Thfp=0)	0	0000 0000
50	value=Thbpmax/2 (pixel clks) (for DE-only timing also, with Thfp=0)	0	0000 0000
51	value=VSPWmin/2 (line pulses)WVL	0	0000 0000
52	value=VSPWmax/2 (line pulses)WVL	0	0000 0000
53	value=Tvbpmin/2	0	0000 0000
54	value=Tvbpmax/2	0	0000 0000
55	Thpmin=value*2+HApixelClks (pixel clks) Note2	0	0000 0000
56	Thpmax=value*2+HApixelClks (pixel clks) Note2	0	0000 0000
57	Tvpmin=value*2+Valines (line pulses)	0	0000 0000
58	Tvpmax=value*2+Valines (line pulses)	0	0000 0000
59	Module revision	0	0000 0000
5A	Flag	0	0000 0000
5B	Flag	0	0000 0000
5C	Flag	0	0000 0000
5D	Data Type Tag: (Monitor) ASCII String	FE	1111 1110
5E	Flag	0	0000 0000
5F	"C",67	43	0100 0011
60	"P",80	50	0101 0000
61	"T",84	54	0101 0100
62		20	0010 0000
63		20	0010 0000
64		20	0010 0000
65		20	0010 0000
66		20	0010 0000
67		20	0010 0000
68		20	0010 0000
69		20	0010 0000
6A		20	0010 0000
6B	(if <13 char, then terminate with ASCII code 0Ah, and set remaining char = 20h)	20	0010 0000
6C	Flag	0	0000 0000
6D	Flag	0	0000 0000
6E	Flag	0	0000 0000
6F	Data Type Tag: (Monitor) ASCII String	FE	1111 1110
70	Flag	0	0000 0000
71	"C",67	43	0100 0011
72	"L",76	4C	0100 1100
73	"A",65	41	0100 0001
74	"A",65	41	0100 0001
75	"1",49	31	0011 0001
76	"0",48	30	0011 0000
77	"2",50	32	0011 0010
78	"N",78	4E	0100 1110
79	"A",65	41	0100 0001

7A	"2",50	32	0011 0010
7B	"C",67	43	0100 0011
7C	(if <13 char, then terminate with ASCII code 0Ah, and set remaining char = 20h)	20	0010 0000
7D	(if <13 char, then terminate with ASCII code 0Ah, and set remaining char = 20h)	20	0010 0000
7E	Extension Flag (# of optional 128-byte EDID extension blocks to follow, typ=0)	0	0000 0000
7F	Checksum (the 1-byte sum of all 128 bytes in this EDID block shall equal zero)	99	1001 1001

Note : 1. Code 10(Hex) (Week of manufacture) & Code 11(Hex) (Year of manufacture), they will change when the date of producing change .

Note : 2. Code 7F(Hex) (checksum), it will change when Note1 change .